

## REMARKS

As a preliminary matter, a proposed drawing correction is submitted herewith. FIG. 2 includes a use of 34 to identify the insulator. This should be "35" as indicated on page 5 of the specification. Approval is requested.

Claims 1 and 13-14 stand rejected under § 102(a) as being anticipated by U.S. Patent No. 5,892,857 to McCallion. The rejection is respectfully traversed. Claim 13 has been canceled, rendering the rejection moot. Claim 14 is re-written in independent form.

The primary basis for the rejection of claim 1 and is the position taken by the examiner that McCallion's channel waveguide meets the claimed microwave waveguide. The reference itself contradicts this premise, and demonstrates that the channel waveguides (60 and 560) in McCallion are optical waveguides. Optical waveguides, as artisans appreciate, are not exclusively microwave waveguides. The term "channel waveguide", as used in McCallion, is a term used to refer to optical waveguides and not microwave waveguides as used in the present application and claims. This is discussed in more detail below.

Another basis for the rejection of claim 1, which is also used to support the rejection of claim 14, is the allegation that McCallion discloses the claim 1 and 14 electro-absorptive material arranged is required. This is contradicted by the McCallion reference. The McCallion reference, contrary to the position taken by the examiner, does not disclose any waveguide having an electro-absorptive material. McCallion accordingly, does not disclose electro-absorptive material arranged as required by claim 1 or claim 14. This will also be discussed in more detail below.

### McCallion's Channel Waveguide is an Optical Waveguide

The rejection of claim 1 depends upon the examiner's identification of the channel waveguide 60 in Fig. 1C (also see channel waveguide 560 with electrodes in Figs. 5-7) as a microwave waveguide. This is incorrect because neither the channel waveguide 60 nor the channel waveguide 560 are microwave waveguides as used in the claim.

McCallion describes the waveguide 60 to be a channel waveguide. Artisans do not refer to microwave waveguides as channel waveguides. Only optical waveguides are referred to as channel waveguides, and McCallion supports this ordinary interpretation and also demonstrates fully that the channel waveguides 60 and 560 are optical waveguides. Although microwave signals can be applied to the electrodes surrounding the channel waveguides, waveguide 60 is not exclusively a microwave waveguide.

In column 2, lines 50 - 60, the channel waveguide is an "optically bound region". Column 3, lines 5 -15 mention that the waveguide 60 could be "electro-optically active" material. In scientific terms, this means that the refractive index of the material is changed by the electric field applied through the electrode. The electro-optical effect means that the propagation of the optical energy in the channel waveguide is changed by the electric field that changed the refractive index. Scientifically, electro-optic effect and electro absorption effect are very different effects. If the "electro-optical" material was the basis for the conclusion that the channel waveguide 60 is a microwave waveguide, the science of "electro-optical" effects and "electro-absorption" effects is fundamentally different.

Additional evidence indicates that McCallion's channel waveguides 60, 560 are not microwave waveguides as claimed. If waveguide 60 were a microwave waveguide its properties would be described by its microwave impedance, attenuation, matching and phase velocity (see, e.g., pages 8 and 9 of the present application). No such discussion is in McCallion. Nor does the word "microwave" appear in McCallion. Instead, McCallion's specification discusses optical effects associated with the channel waveguides. Column 1, lines 52-64, clearly states that the change in the intensity of the first waveguide is modulated by the refractive index change in the second waveguide. This clearly identifies that both waveguides are optical waveguides. Electro-absorption is not mentioned.

No Electro-Absorptive Material is Disclosed in McCallion

Claims 1 and 14 require electro-absorptive material arranged with respect to the optical wave's evanescent tail. No electro-absorptive material is disclosed in McCallion.

The materials for the channel waveguides 60, 560 in McCallion are listed in column 10, lines 53-56. None of these materials are electro-absorptive materials. Instead, they are all materials that experience a refractive index change in response to applied electric field (electro-optical materials).

Contrary to the position taken on page 3 of the office action, makes no mention of electro-absorption in waveguide 60. Column 4, line 51 - column 5, line 5 instead discuss the diffraction effects that lead to a spectral response that does not suffer insertion losses. Insertion loss is caused by diffraction.

In Column 8, line 35 - column 9, line 4, McCallion clearly discussed that the electrode structure is arranged to provide the electric field to tune the spectral response of the channel waveguide. Spectral tuning is achieved by change of refractive index. This further demonstrates that McCallion's electro-optical interaction refers only to the change of refractive index by applied electric field, not by electro-absorption. Electro-absorption is a change of the absorption coefficient of semi-conductor materials due to shift in conduction-valence band-edge by the applied electric field.

Claims 8-12 and 15-17 stand rejected under § 103 as being obvious in view of McCallion. The rejection is respectfully traversed.

Regarding claims 8-12, the overall premise in this rejection is that the claimed materials would have been obvious substitutions in McCallion because McCallion discloses electro-absorptive materials. An important flaw in this premise (which is not conceded) is that McCallion doesn't disclose any electro-absorptive materials. The theory of obviousness with respect to each of claims 8-12 is therefore incorrect.

The rejection of claim 17 is separately traversed. The examiner concludes it is "well known in the art to transmit optical waves via single optical fibers and then couple said fibers to signal processing components, such as modulators." This does not address the claim features, and is also not supported by knowledge in the art. Claim 17 requires a "direct coupling" of a single mode fiber optical wave into the claimed optical waveguide. As described in the background of the application, there are design trade offs in conventional microwave modulator design remain that unresolved problems prior to the invention. McCallion does not contemplate any solution for addressing this problem as is

specifically addressed in the applicable claim. McCallion is silent as to the method of coupling. Should the rejection be maintained, it is respectfully requested that references be cited to support the proposition that the features of the claim are, in fact, well known.

Claim 2 stands rejected under § 103 over McCallion, as applied to claim 1 and in further view of U.S. Patent No. 5,082,342 to Wight. The rejection is respectfully traversed.

In addition to the grounds expressed separately with respect to claim 1, the rejection of claim 2 is also based upon an incorrect interpretation of Wight. Apparently, the examiner considers lower layers in Wight (see layers such as 158 and 160) to be a separate waveguide. This is not supported. In FIGs. 12 and 13, of Wight, for example, there is a combination of two or more waveguides that produces separate outputs. There is a central waveguide 152. There may be additional adjacent waveguides as shown in FIG. 12. Lower layers, such as layer 158 and 160, are cladding layers. There are not separate microwave and optical waveguides, with the optical waveguide structured in accordance with claim 2.

New claims 19-22 are added. These claims further detail aspects of preferred embodiments. New claim 19 specifies the confinement factor in a similar fashion to claim 18 (which was deemed allowable). Claims 20 and 22 address the mode of the optical waveguide. Claim 21 addresses the particular arrangement of the P-contact and the microwave waveguide. The art, as discussed above, does not disclose nor suggest broader aspects of these embodiments in associated independent claims, and certainly does not disclose the particular features in new claims 20-22.

For all of the above reasons, reconsideration and allowance of the instant application is requested. Should the examiner have any questions or concerns that could be resolved by a telephone conference, the examiner is invited to contact the undersigned attorney at the below listed number.

Respectfully submitted,

GREER, BURNS & CRAIN, LTD.

By



Steven P. Fallon

Registration No. 35,132

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300 South Wacker Drive, Suite 2500  
Chicago, Illinois 60606  
(312) 360-0080  
Customer No. 24978

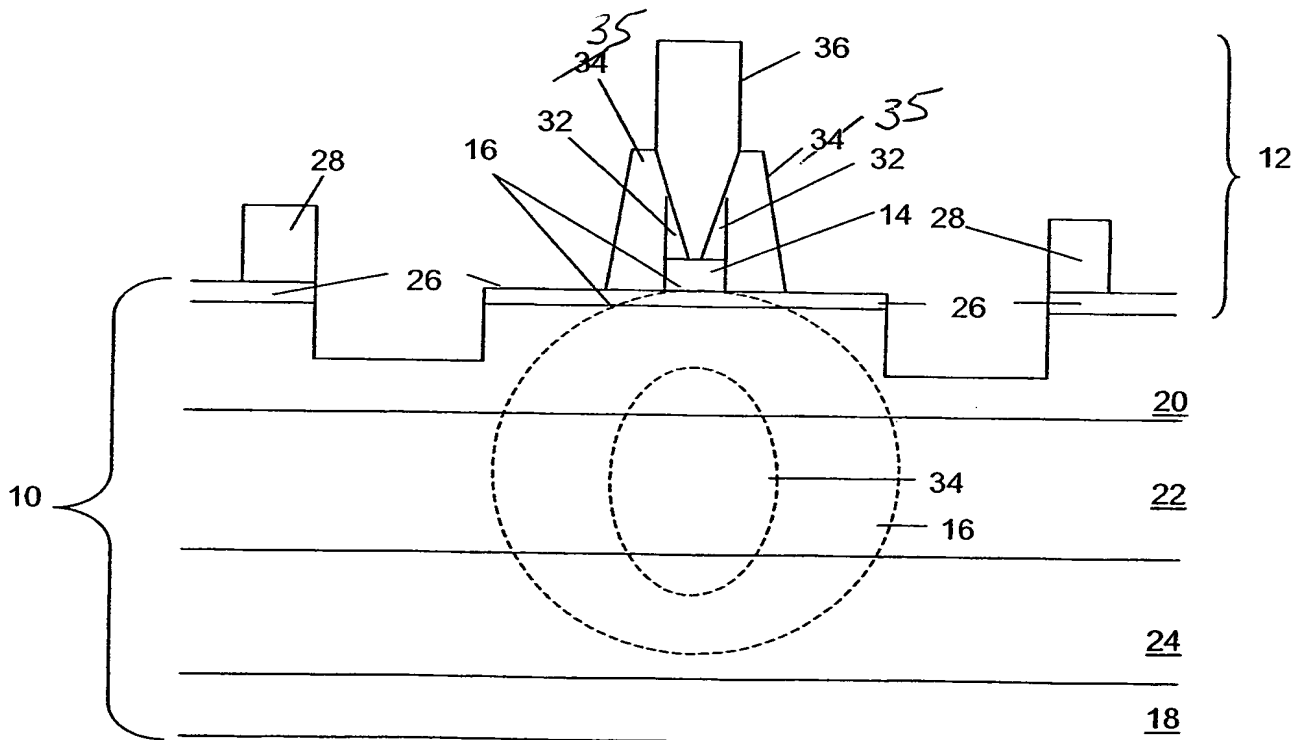


FIG. 2